REMARKS

The Applicants do not believe that entry of the foregoing response will result in the introduction of new matter into the present application for invention. Therefore, the Applicants, respectfully, request that the above amendment be entered in and that the claims to the present application, kindly, be reconsidered.

The Office Action dated Final Office Action dated June 9, 2004 has been received and considered by the Applicants. Claims 1-20 are pending in the present application for invention. Claims 1-20 are rejected by the June 9, 2004 Final Office Action. Claim 18 is objected to by the Examiner. The Examiner's suggestion for replacing "is" with "are" in line 1 of Claim 16 has been accomplished by the foregoing amendment to the claims.

The Final Office Action states that Claims 1-2, 4-10, and 12-14 are rejected under the provisions of 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,191,889 issued to Maruyama (hereinafter referred to as Maruyama). The Applicants, respectfully, point out that the Final Office Action presents arguments that Claims 15, 16, 18 and 19 are anticipated by Maruyama. Accordingly, the Applicants view this rejection as being a rejection of Claims 1-2, 4-10, 12-14 15, 16, 18 and 19 under the provisions of 35 U.S.C. §102(e) as being anticipated by Maruyama. The Examiner states that Maruyama discloses all the recited elements of the rejected claims. The Applicants, respectfully, disagree. Maruyama discloses a diffraction grating and the rejected claims do not recite a diffraction grating. The present invention recites a phase structure made of a material having temperature-dependent properties and resulting in a non-periodic pattern of optical paths for the radiation beam. The cited reference, Maruyama, discloses a diffraction grating. There is no disclosure, or suggestion within Maruyama for a phase structure as recited by the rejected claims. The diffraction grating taught by Maruyama is formed as a saw tooth pattern. The claims recite a phase structure that is more rectangular in shape. Accordingly, the Applicants respectfully submit that even a very broad reading of Maruyama does not read on the claims.

Regarding Claim 1, the Examiner states that Maruyama discloses an optical head for scanning an optical record carrier having an information layer (Col. 1, lines 5-10), the head

comprising a radiation source for generating a radiation beam (Col. 2, lines 7-10), an optical system for converging the radiation beam to a focus on the information layer along an optical axis (Figs. 1A-1B, element 10 and Col, 4 lines 28-30).

The Examiner further states that Maruyama discloses that the optical system imparting a temperature-dependent first wavefront deviation to the radiation beam (Col. 1, lines 16-24). The Applicants, respectfully, point out that Col. 1, lines 16-24 of Maruyama discuss a problem that exist with the prior art using plastic lens whereby the refractive index decreases with increasing temperature crating an overcorrection in spherical aberrations and a resulting increase in wave front aberration. There is no disclosure within Maruyama for an optical system that imparts a temperature-dependent first wavefront deviation to the radiation beam.

The Examiner further states that Maruyama discloses a compensator arranged in the radiation beam for compensating the first wavefront deviation (Figs. 1A-1C, element 11). The Applicants would like to draw attention to the discussion within Maruyama on Col. 4, lines 51-59, wherein it is stated that the refractive lens changes the spherical aberration in the overcorrected direction. Maruyama does not disclose or teach an optical system that imparts a temperature-dependent first wavefront deviation to the radiation beam.

The Examiner further states that Maruyama discloses a phase structure of a material having temperature-dependent properties, the phase structure having the form of a plurality of annular areas forming a non-periodic pattern of optical paths of different, temperature-dependent lengths in Fig. 1C and Col. 1, lines 66-67. The Applicants, respectfully, point out that the cited portion of Maruyama discloses a diffractive grating having a plurality of concentric ring-shaed steps. There is no disclosure or suggestion within Maruyama for a phase structure having a plurality of annular areas forming a non-periodic pattern of optical paths of different, temperature-dependent lengths.

The Examiner further states that Maruyama discloses that the optical paths form a second wavefront deviation compensating the temperature-dependent first wavefront deviation at Col. 1, lines 10-17 and Col. 4, lines 51-59. The Applicants, respectfully point out that Col. 1, lines 10-17 of Maruyama discloses only that a plastic lens can have a disadvantage due to heat. Col. 4, lines 51-59 of Maruyama discloses the refractive lens changes the spherical aberration in the overcorrected direction with temperature increases and that the diffractive grating changes the spherical aberration in the under-corrected direction compensating for the change in the

overcorrected direction. Note, that there is no disclosure or suggestion of a non-periodic pattern of optical paths of different, temperature-dependent lengths that form a second wavefront deviation compensating for the first wavefront deviation. The changes discussed in Maruyama are strictly refractive and there is no disclosure or suggestion for a non-periodic pattern of optical paths of different.

Additionally, the Examiner states that Maruyama discloses that the annular areas each have a width measured radially from the optical axis in Fig. 1A and a consistent height measured along the optical axis in Fig. 1C. The Examiner states that the annular areas are inherently measured radially from the optical axis. The Examiner further states that the height of each annular area measured in along the optical axis is consistent in the circumferential direction. The Applicants must point out that this statement is clearly not true. The diffraction gratings shown in Fig. 1C of Maruyama clearly do not have consistent heights as recites by rejected Claim1. each of the diffraction gating within Maruyama have inconsistent heights measured along the optical axis. Therefore, due to the numerous aforementioned differences between rejected Claim 1 and the disclosure of Maruyama, the rejection of Claim 1 is respectfully, traversed.

Regarding Claim 2, the Examiner states that Maruyama discloses that the optical system comprises an objective system imparting a spherical aberration as the first wavefront deviation to the radiation beam at Col. 4, lines 51-53. The Applicants, respectfully, disagree. This portion of Maruyama discloses that the refractive lens and the diffractive grating change existing spherical aberrations not that the objective system imparts a spherical aberration. Accordingly, this rejection is, respectfully, traversed.

Regarding Claim 4, the Examiner states that Maruyama discloses that the differences between the optical paths are multiples of the wavelengths of the radiation beam for at least one temperature at Col. 4, lines 63-64. The Applicants, respectfully, disagree. This portion of Maruyama discloses that an additional optical path is added by the diffractive grating. Rejected Claim 4 defines subject matter for differences in the optical paths that are formed from the phase structure that are multiples of the wavelength of the radiation beam. The function $\Phi(h)$ that the Examiner refers to represents an optical path difference between an imaginary ray that is assumed not to be diffracted by the grating and an actual ray that is diffracted (see Col. 4, line67 through Col. 5, line 4 of Maruyama). There is no disclosure or suggestion so within Maruyama to create a phase structure with annular areas that are optical paths formed that are multiples of

the wavelength of the radiation beam. Accordingly, this rejection is respectfully, traversed.

Regarding Claim 5, the Examiner states that Maruyama discloses that at least one of the multiples is equal to two or larger (Col. 4, lines 63-64). The function $\Phi(h)$ that the Examiner refers to represents an optical path difference between an imaginary ray that is assumed not to be diffracted by the grating and an actual ray that is diffracted (see Col. 4, line67 through Col. 5, line 4 of Maruyama). There is no disclosure or suggestion so within Maruyama to create a phase structure with optical paths that are formed from annular areas that are multiples of the wavelength of the radiation beam. Moreover, there is no disclosure or suggestion so within Maruyama that at least one of the multiples is equal to two or larger because the multiples that Maruyama discusses are between an optical path that is added by the diffractive grating and not between multiple the optical paths formed by the annular areas. Accordingly, this rejection is respectfully, traversed.

Regarding Claim 6, the Examiner states that Maruyama discloses that the temperature-dependence of the first wavefront deviation is due to the temperature dependence of the wavelength of the radiation beam generated by the radiation source at Col. 4, lines 41-46. The Applicants, respectfully, disagree. Col. 4, lines 41-46 of Maruyama discloses that the wavelength of the laser increases with temperature. The firs wavefront deviation recited by rejected Claim 6 is formed from the optical system. Accordingly, this rejection is respectfully traversed.

Regard Claim 7, the Examiner states that Maruyama discloses a device for scanning an optical record carrier having an information layer, the device comprising an optical head according to Claim 1 and an information processing unit for error correction at Col. 5, lines 57-64. Claim 7 depends from Claim 1 and further narrows and defines Claim 1. Claim 1 as previously discussed is believed to be allowable, therefore, Claim 7 is also believed to be allowable.

Regarding Claim 8, the Examiner states that Maruyama discloses the subject matter defined by rejected Claim 8. The Applicants respectfully disagree. The Examiner further states that Maruyama discloses a compensator arranged in the radiation beam for compensating the first wavefront deviation (Figs. 1A-1C, element 11). The Applicants would like to draw attention to the discussion within Maruyama on Col. 4, lines 51-59, wherein it is stated that the refractive lens changes the spherical aberration in the overcorrected direction. Maruyama does

not disclose or teach an optical system that imparts a temperature-dependent first wavefront deviation to the radiation beam.

The Examiner states that Maruyama discloses that the optical system imparting a temperature-dependent first wavefront deviation to the radiation beam (Col. 1, lines 16-24). The Applicants, respectfully, point out that Col. 1, lines 16-24 of Maruyama discuss a problem that exist with the prior art using plastic lens whereby the refractive index decreases with increasing temperature crating an overcorrection in spherical aberrations and a resulting increase in wave front aberration. There is no disclosure within Maruyama for an optical system that imparts a temperature-dependent first wavefront deviation to the radiation beam.

The Examiner further states that Maruyama discloses a phase structure of a material having temperature-dependent properties, the phase structure having the form of a plurality of annular areas forming a non-periodic pattern of optical paths of different, temperature-dependent lengths in Fig. 1C and Col. 1, lines 66-67. The Applicants, respectfully, point out that the cited portion of Maruyama discloses a diffractive grating having a plurality of concentric ring-shaed steps. There is no disclosure or suggestion within Maruyama for a phase structure having a plurality of annular areas forming a non-periodic pattern of optical paths of different, temperature-dependent lengths.

The Examiner further states that Maruyama discloses that the optical paths form a second wavefront deviation compensating the temperature-dependent first wavefront deviation at Col. 1, lines 10-17 and Col. 4, lines 51-59. The Applicants, respectfully point out that Col. 1, lines 10-17 of Maruyama discloses only that a plastic lens can have a disadvantage due to heat. Col. 4, lines 51-59 of Maruyama discloses the refractive lens changes the spherical aberration in the overcorrected direction with temperature increases and that the diffractive grating changes the spherical aberration in the under-corrected direction compensating for the change in the overcorrected direction. Note, that there is no disclosure or suggestion of a non-periodic pattern of optical paths of different, temperature-dependent lengths that form a second wavefront deviation compensating for the first wavefront deviation. The changes discussed in Maruyama are strictly refractive and there is no disclosure or suggestion for a non-periodic pattern of optical paths of different temperature dependent lengths.

Additionally, the Examiner states that Maruyama discloses that the annular areas each have a width measured radially from the optical axis in Fig. 1A and a consistent height measured

along the optical axis in Fig. 1C. The Examiner states that the annular areas are inherently measured radially from the optical axis. The Examiner further states that the height of each annular area measured in along the optical axis is consistent in the circumferential direction. The Applicants must point out that this statement is clearly not true. The diffraction gratings shown in Fig. 1C of Maruyama clearly do not have consistent heights as recites by rejected Claim 8. each of the diffraction gating within Maruyama have inconsistent heights measured along the optical axis. Therefore, the rejection of Claim 8 is respectfully, traversed.

Regarding Claim 9, the Examiner states that Maruyama discloses that the differences between the optical paths are multiples of the wavelength of the radiation beam for at least one temperature at Col. 4, lines 63-64. The Applicant, respectfully, disagree. This portion of Maruyama discloses that an additional optical path is added by the diffractive grating. Rejected Claim 4 defines subject matter for differences in the optical paths that are formed from the phase structure that are multiples of the wavelength of the radiation beam. The function $\Phi(h)$ that the Examiner refers to represents an optical path difference between an imaginary ray that is assumed not to be diffracted by the grating and an actual ray that is diffracted (see Col. 4, line67 through Col. 5, line 4 of Maruyama). There is no disclosure or suggestion so within Maruyama to create a phase structure with annular areas that are optical paths formed that are multiples of the wavelength of the radiation beam. Accordingly, this rejection is respectfully, traversed.

Regarding Claim 10, the Examiner states that Maruyama discloses that the first wavefront deviation is spherical aberration at Col. 4, lines 51-53. The Applicants, respectfully, disagree. This portion of Maruyama discloses that the refractive lens and the diffractive grating change existing spherical aberrations not that the objective system imparts a spherical aberration. Accordingly, this rejection is, respectfully, traversed.

Regarding Claim 12, the Examiner states that Maruyama discloses that the optical element is a lens at (Col. 1, line 9). Claim 12 depends from and further narrows and defines Claim 8. Therefore, since Claim 8 is believed to be allowable, Claim 12 is also believed to be allowable.

Regarding Claim 13, the Examiner states that Maruyama discloses that the optical element and the compensator are integrated in a single element in Figs. 1A-1B. Claim 13 depends from and further narrows and defines Claim 8. Therefore, since Claim 8 is believed to be allowable, Claim 13 is also believed to be allowable.

Regarding Claim 14, the Examiner states that Maruyama discloses that the optical system includes a diffractive structure at Col. 1, line 10. The Applicant respectfully points out that Claim 14 defines subject matter for a diffractive structure that is in addition to the phase structure defined by Claim 8. The recitation of Claim 14 does **not** define subject matter wherein the phase structure is the diffractive structure. There are two separate elements recited by Claim 14, the phase structure of Claim 8 and the diffractive structure of Claim 14, the Examiner is using the same element within Maruyama to read on both phase structure and the diffractive structure; which is improper. To anticipate, each element must be found within the cited reference. The Final Office Action has attempted to use a single element to read on two separate elements. Therefore, this rejection is respectfully traversed. Alternatively, Claim 14 depends from and further narrows and defines Claim 8. Therefore, since Claim 8 is believed to be allowable, Claim 13 is also believed to be allowable.

Regarding Claims 15 and 18, the Examiner states that Maruyama discloses that the heights of the annular areas differ forming a step pattern proceeding radially from the optical axis at Fig. 1C and Col. 1, line 65-Col. 2, line 1. Claims 15 and 18 depend and further narrow and define Claims 1 and 8 from which they respectively depend. Therefore, since Claims 1 and 8 is believed to be allowable, Claims 15 and 18 are also believed to be allowable.

Regarding Claims 16 and 19, the Examiner states that Maruyama discloses that the widths of the annular areas are substantially greater than the heights in Fig. 1C. The Applicants, respectfully assert that the Examiner is reading subject matter into Maruyama that is not disclosed. Fig. 1C provides no indication that the widths of the annular areas are substantially greater than the heights. The Applicants request that the Examiner indicate where there is any disclosure within the four corners of Maruyama that the widths of the annular areas are substantially greater than the heights. The Applicants respectfully assert that there is no such disclosure.

The Final Office Action rejects Claims 1-2, 4, 5 and 8-14 under the provisions of 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,590,708 B1 issued to Nakai et al. (hereinafter referred to as Nakai et al.). The Applicants, respectfully, point out that the Final Office Action presents arguments that Claims 15, 17, 18 and 20 are anticipated by Nakai et al. Accordingly, the Applicants view this rejection as being a rejection of Claims 1-2, 4, 5, 8-14, 15, 17, 18 and 20 under the provisions of 35 U.S.C. §102(e) as

being anticipated by Nakai et al. The Examiner states that Nakai et al. discloses all the recited elements of the rejected claims. The Applicants, respectfully, disagree. Nakai et al. discloses a plurality of diffracting surfaces while the rejected claims recite a phase structure. The phase structure made of the present invention recites recited as being formed of a material having temperature-dependent properties and resulting in a non-periodic pattern of optical paths for the radiation beam. The cited reference, Nakai et al., discloses a diffraction surface. There is no disclosure, or suggestion within Nakai et al. for a phase structure as recited by the rejected claims. The diffraction grating taught by Nakai et al. is formed as a saw tooth pattern. The rejected claims recite a phase structure which is shown in Fig. 2 of the present application for invention as being more rectangular in shape. Accordingly, the Applicants respectfully submit that even a very broad reading of Nakai et al. does not read on the rejected claims.

Regarding Claim 1, the Examiner states that Nakai et al. disclose the subject matter defined by rejected Claim 1 including a compensator with a phase structure of a material having temperature-dependent properties, the phase structure having the form of a plurality of annular areas forming a non-periodic pattern of optical paths of different, temperature-dependent lengths, the optical paths forming a second wavefront deviation compensating the temperature-dependent first wavefront deviation at Fig. 4; Col 1. line 25 and Col. 2, lines 22-29. The Applicants respectfully point out that Nakai et al. disclose diffractive structures and not phase structures.

The Examiner further states that Nakai et al. disclose annular areas that each have a width measured radially from the optical axis and a consistent height measured along the optical axis in Fig. 4, element 2. The Applicants respectfully, assert that there is no disclosure or suggestion in Fig. the elements 2 have a consistent height measured along the optical axis.

Regard Claim 2, the Examiner further states that Nakai et al. disclose that the optical system comprises an objective system imparting spherical aberration as the first wavefront deviation to the radiation beam at Col. 2, lines 27-28. The Applicants, respectfully, point out that Nakai et al. disclose that the spherical aberration remains the same **not** that the objective system imparting spherical aberration as the first wavefront deviation to the radiation beam as contended by the Examiner. Accordingly, this rejection is traversed.

Regarding Claim 4, the Examiner further states that Nakai et al. disclose that the differences between the optical paths are multiples of the wavelength of the radiation beam for at

least one temperature at Col. 3, lines 40-44. The Applicants, respectfully, point out that the equation on Col. 3, lines 40-44 of Nakai et al. determines the depth of the diffraction grating along the optical axis. Rejected Claim 4 defines subject matter for differences between the optical paths. According, the Applicants submit that this rejection is not on point and it is, therefore, traversed.

Regarding Claim 5, the Examiner further states that Nakai et al. disclose that at least one of the multiples is equal to two or larger at Col. 3, lines 40-44. The Applicants, respectfully, point out that the equation on Col. 3, lines 40-44 of Nakai et al. determines the depth of the diffraction grating along the optical axis. Rejected Claim 5 defines subject matter for differences between the optical paths being two or greater. According, the Applicants submit that this rejection is not on point and it is, therefore, traversed.

Regarding Claim 8, the Examiner states that Nakai et al. disclose the optical system defined by rejected Claim 8, the Applicants, respectfully disagree. The Examiner states that Nakai et al. disclose a phase structure of a material having temperature-dependent properties, the phase structure having the form of a plurality of annular areas forming a non-periodic pattern of optical paths of different, temperature-dependent lengths, the optical paths forming a second wavefront deviation compensating the temperature-dependent first wavefront deviation at Fig. 4; Col. 1, line 25; and Col. 2. lines 22-29, wherein the annular areas each have a width measured radially from the optical axis and a consistent height measured along the optical axis (Fig. 4, element 2). Each annular area has a consistent height measured along the optical axis in the circumferential direction. As previously stated with respect to Claim 1, Nakai et al. do not disclose or suggest a phase structure. Furthermore, Nakai et al. do not disclose or suggest a plurality of annular areas forming a non-periodic pattern of optical paths of different, temperature-dependent lengths, the optical paths forming a second wavefront deviation compensating the temperature-dependent first wavefront deviation. Moreover, Nakai et al. do not disclose or suggest that each annular area has a consistent height measured along the optical axis in the circumferential direction. Accordingly, this rejection is, respectfully, traversed.

Regarding Claim 9, the Examiner states that Nakai et al. disclose the differences between the optical paths are multiples of the wavelength of the radiation beam for at least one temperature at Col. 3, lines 40-44. The Applicants, respectfully, point out that the equation on Col. 3, lines 40-44 of Nakai et al. determines the depth of the diffraction grating along the optical

axis. Rejected Claim 9 defines subject matter for differences between the optical paths being two or greater. According, the Applicants submit that this rejection is not on point and it is, therefore, traversed.

Regarding Claim 10, the Examiner states that Nakai et al. disclose the first wavefront deviation is spherical aberration at Col. 2, lines 27-28. The Applicant would like to point out that Col. 2, lines 27-28 of Nakai et al. disclose that any spherical aberration remains constant **not** that a spherical aberration is imparted by an optical element as recited by Claim 10. Therefore, this rejection is respectfully traversed.

Regarding Claim 11, the Examiner states that Nakai et al. disclose the first wavefront deviation is defocus at Col. 2, line 27. The Applicant would like to point out that Col. 2, line 27 of Nakai et al. states that the diffraction surfaces maintain the focal point relative to temperature changes **not** that a defocus is imparted by an optical element as recited by Claim 11. Therefore, this rejection is respectfully traversed.

Regarding Claim 12, the Examiner states that Nakai et al. disclose the optical element is a lens at Col. 3, lines 15-26. Claim 12 depends from and further narrows and defines Claim 8, which as previously discussed is believed to be allowable. Therefore, Claim s 12 is believed to be allowable.

Regarding Claim 13, the Examiner states that Nakai et al. disclose the optical element and the compensator are integrated in a single element in Fig. 4. Claim 13 depends from and further narrows and defines Claim 8, which as previously discussed is believed to be allowable. Therefore, Claim s 13 is believed to be allowable.

Regarding Claim 14, the Examiner states that Nakai et al. disclose the optical system includes a diffractive structure at Col. 3, lines 15-26. The recitation of Claim 14 does **not** define subject matter wherein the phase structure is the diffractive structure. There are two separate elements recited by Claim 14, the phase structure of Claim 8 and the diffractive structure of Claim 14, the Examiner is using the same element within Nakai et al. to read on both phase structure and the diffractive structure; which is improper. To anticipate, each element must be found within the cited reference. The Final Office Action has attempted to use a single element to read on two separate elements. Therefore, this rejection is respectfully traversed. Alternatively, Claim 14 depends from and further narrows and defines Claim 8. Therefore, since

Claim 8 is believed to be allowable, Claim 13 is also believed to be allowable.

Regarding Claims 15 and 18, the Examiner states that Nakai et al. disclose the heights of the annular areas differ forming a step pattern proceeding radially from the optical axis at Col. 7, lines 2-4. Claims 15 and 18 depend and further narrow and define Claims 1 and 8 from which they respectively depend. Therefore, since Claims 1 and 8 is believed to be allowable, Claims 15 and 18 are also believed to be allowable.

Regarding Claims 17 and 20, the Examiner admits that Nakai et al. do **not** disclose the annular areas cause an integral number of $2n$ phase changes in the radiation beam. Therefore, Nakai et al. can not anticipate Claims 17 and 20 and this rejection is traversed. Alternatively, Claims 17 and 20 depend and further narrow and define Claims 1 and 8 from which they respectively depend. Therefore, since Claims 1 and 8 is believed to be allowable, Claims 17 and 20 are also believed to be allowable.

The Office Action rejects Claim 3 under the provisions of 35 U.S.C. §103(a) as being obvious over Maruyama in view of U.S. Patent No. 6,154,326 issued to Ueyanagi et al. (hereinafter referred to as Ueyanagi et al.). As previously discussed Maruyama does not disclose the subject matter of Claim 1, therefore, this rejection must fail and is accordingly, traversed.

Applicant is not aware of any additional patents, publications, or other information not previously submitted to the Patent and Trademark Office which would be required under 37 C.F.R. 1.99.

In view of the foregoing amendment and remarks, the Applicant believes that the present application is in condition for allowance, with such allowance being, respectfully, requested.

Respectfully submitted,

By _____

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